element (not illustrated in Figure 2; see Figures 6a and 6b) provided on a distal end of cannula 102.

Figures 3a and 3b illustrate cross-sectional views of inner cannula 116, as taken at line 3-3. In the embodiment illustrated in Figure 3a, inner cannula 116 includes a sidewall 126 which has a thickness T, and has an outer radius R_o. Actuating portion 140 of cutting wire 136 is not illustrated in Figure 3a for purposes of clarity, but is located in lumen 146. Inner cannula 116 can optionally further be provided with an additional lumen 147 in sidewall 126, which extends from cutout 124 proximally to the proximal end of the inner cannula, for allowing a practitioner to inject an anesthetic, e..g., Lidocaine, into the tissue to be sampled. Alternatively, such an anesthetic can be injected distally through main lumen 122, in which embodiment lumen 147 can be eliminated. In yet another embodiment (not illustrated), inner cannula 116 is formed slightly undersized relative to outer cannula 152 (see Figure 4) to form an annular lumen therebetween, for injecting such an anesthetic. In yet another embodiment (not illustrated), a channel can be formed in the exterior surface of inner cannula 116, which together with the inner surface of outer cannula 152 (see Figure 4) forms a pathway for a practitioner to inject an anesthetic distally to anesthetize the tissue to be sampled.

Figure 3b illustrates an alternate embodiment, in which an inner cannula 116′ has a sidewall 126′ with thickness that varies continuously between a maximum T_{max} and a minimum T_{min}. Inner cannula 116′ includes an outer radius R_o and an inner radius R_i, which are taken from two separate longitudinal axes which are separated by a distance D. Lumen and conductor 150 are preferably located in the thickest part of sidewall 126′, so that the average thickness of the sidewall can be reduced while still providing lumen 146 and conductor 150.

Turning now to Figure 4a, a distal portion of an outer cannula 152 of cannula 102 is illustrated in perspective. Outer cannula 152 is generally tubular in construction, and includes a distal end 154, a proximal end (not illustrated), and a longitudinal axis 156 extending between the proximal end and distal end 154. Outer cannula 152 includes a main lumen 158 extending through the outer cannula which has an inner radius R_i selected to be slightly larger than outer radius R_o of inner cannula 116, 116', so that the inner cannula can be slidingly received in the outer cannula main lumen.

Outer cannula 152 includes a sidewall 160 which preferably has a constant thickness formed of a material which is similar to that of inner cannula 116. In a manner similar to inner cannula 116, outer cannula 152 includes a cutout, slot, window, or fenestration 162 formed in sidewall 160. Cutout 162 is formed by sidewalls 164, 166, a proximal endwall 168, and a distal endwall 170. The longitudinal length of cutout 162, i.e., the length of sidewalls 164, 166, is preferably selected to be substantially the same as the length of sidewalls 128, 130 of inner cannula 116. In a less preferred embodiment, the length of sidewalls 164, 166 can be more or less than the length of sidewalls 128, 130.

Preferably, sidewalls 164, 166 are longitudinally extending, i.e., extend parallel to axis 156, and endwalls 168, 170 extend perpendicular to sidewalls 164, 166. The angular separation of sidewalls 164, 166, that is, the angle β which is defined between sidewalls 164, 166, is selected so that the cutout 162 is large enough to allow cutting loop 138 to be rotated through the outer cannula cutout, when inner cannula 116 is in lumen 158. Angle β is typically about 180°, although other values for angle β are within the spirit and scope of the invention as will be readily apparent to one of ordinary skill in the art. The inner surface 172 of lumen 158 is preferably coated with a lubricious material to facilitate rotation of inner cannula 116 relative to outer cannula 152, as described in greater detail below.

Figure 4b illustrates another embodiment of outer cannula 152, in which sidewall 160 is provided with the passageway for cutting wire 136, as a small lumen 169. Cutting wire 136 (illustrated in phantom in Figure 4b) is located in lumen 169 in a manner similar to lumen 146 (see Figure 2), such that cutting wire 136 is rotatable and longitudinally extendable therein. In the embodiment illustrated in Figure 4b, angle β is greater than angle α of inner cannula 116, so that cutting loop 138 will not catch on sidewall 128 as cutting loop 138 is rotating into and out of main lumen 122.

Figures 5a-5d illustrate end views of several embodiments of cutting loops usable in the present invention. The cutting loops illustrated in Figures 5a-5d are preferably closed cutting loops. The term "closed" within the context of cutting loops as described in the present application refers to geometries of a cutting loop which, when projected onto a plane that is perpendicular to actuating portion 140, form a continuous and closed shape. Thus, the term "closed" includes geometries of cutting loops with free ends that do not touch the rest of the loop, as well as those that do not have free ends. Closed cutting loops have the advantage of allowing a sample of tissue to be cut with a minimum number of cutting strokes.

Figure 5a illustrates cutting loop 138 as illustrated in Figure 2. Cutting loop 138 is generally circular, has an outer radius R_o, and is closed. Cutting loop 138 includes an end 174 that meets with the rest of the cutting loop and is preferably welded or soldered thereto. Figure 5b illustrates a cutting loop 176 in accordance with yet another embodiment. Cutting loop 176 includes a generally circular portion 178 describing an outer radius R_o, and an end 180 which has been joined to the rest of the cutting loop. End 180 extends inwardly from the circular portion 178, and preferably is curved on a radius R_E taken from a point outside of cutting loop 176. End 180 is provided as an inwardly extending curved portion of loop 176 in order to reduce the amount of unsampled space when the cannula 102 is used to sample tissue, as described in greater detail below.